Arterial Blood Supply of the Nose and the Pharynx: An Angiographic Study

Thesis

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List of Abbreviations

Abb.	Full term
AEA	Anterior ethmoidal aretery
AphA	Ascending pharyngeal artery
CCA	Common Carotid artery
CT	Computed tomography
DPA	Descending palatine artery
ECA	External carotid artery
ICA	Internal Carotid Artery
ILT	Inferior lateral trunk
IMA	Internal maxillary artery
MHT	Meningeal hypophyseal trunk
MMA	Middle meningeal artery
PEA	Posterior ethmoidal artery
PPF	Pterygopalatine fossa
SPA	Sphenopalatine artery
SPF	Sphenopalatine foramen

Introduction

Major nasal blood flow is provided simultaneously by the external and internal carotid arteries. Variability exists in patient anatomy (with some vessels absent), as well as in physical features (with higher blood pressure in the external vs internal carotid artery **(Saban et al., 2012).**

The external carotid artery (ECA) provides arterial flow to the nose via the facial and internal maxillary artery. The internal carotid artery (ICA) supplies the nose via the terminal branches of the ophthalmic artery and the anterior and posterior ethmoid arteries. Detailed knowledge of the arterial anatomy of this region is important for safe and successful treatment **(Fatakia et al., 2010).**

Arterial blood supply of the pharynx is derived primarily from the ECA and its main branches including the ascending pharyngeal artery. The tonsillar artery branch of the facial artery, the greater palatine and pterygoid branches of the maxillary artery and the dorsal lingual branches of the lingual artery provide an additional blood supply to the pharynx. The ascending pharyngeal artery, although small, is an important vessel with a territory that includes several deep extra- and intracranial structures involved in a variety of disease processes **(Hacein-Bey et al., 2002).**

Even in the absence of vascular anomalies or clearly visible anastomoses, a number of small vessels still serve as potential connections between the ECA and ICA. These include the artery of the foramen rotundum, the vidian artery, the middle meningeal artery, the accessory meningeal artery, the ascending pharyngeal artery, the inferolateral trunk, the meningohypophysial trunk, and communications between the facial artery, sphenopalatine artery and ophthalmic artery **(Willemsa et al., 2009).**

Following sphenopalatine artery occlusion, ischaemic necrosis is a potential risk in anatomical areas that receive their only arterial supply from this artery. The staging of bilateral sphenopalatine artery occlusion needs to be studied **(Elsheikh and Elanwar, 2013).**

Embolization procedures for extracranial disease in the head and neck region are mostly performed for intractable epistaxis or in the presence of a hypervascular tumor either prior to surgical removal or as a palliative treatment **(Bilbao et al., 2006).**

Complete selective external and internal carotid angiograms are essential to evaluation of arterial blood supply **(Krajina & Chrobok, 2014).** Lasjaunias stressed their importance as in some cases, they may reveal specific abnormalities indicating the cause and location of the hemorrhage. These include contrast extravasation, a tumor blush, a vascular malformation, a traumatic pseudoaneurysm, or another unusual ICA source of epistaxis. Furthermore, angiography enables identification of vascular anomalies, variants, or anastomoses between the ECA and ICA or ophthalmic artery that could increase the risk of complications, such as stroke or blindness during embolization. These findings may influence the embolization protocol or even lead to aborting the procedure and referral to surgery **(Lasjaunias et al., 1979), (Willemsa et al., 2009).**

Aim of the Study

Our aim is to define origin, number, target and branches of the arteries supplying the nose and the pharynx and know related different anatomical variations and their percentage.

Review of Literature

(Anatomy and Radiological Anatomy)

The internal and external carotid arteries are the main arterial supply to the head and neck. The internal carotid artery arises at the bifurcation of the common carotid artery and continues upwards in the neck. The internal carotid artery is deep to the sternomastoid muscle, hypoglossal nerve, the lingual and facial veins. It is separated from the external carotid artery by the styloid process, styloglossus, stylopharyngeus muscle, glossopharyngeal nerve, pharyngeal branch of vagus nerve and the deep part of the parotid gland. At the base of the skull the last four cranial nerves lie between the internal carotid artery and the internal jugular vein. The pharyngeal wall lies medial to the artery separated from it by the ascending pharyngeal artery and the superior laryngeal nerve **(Standring, 2005), (Ozgur et al., 2007).**

The external carotid artery usually begins at the upper border of thyroid cartilage. At first, it ascends slightly forwards then inclines backwards and a little laterally to enter into the substance of the parotid gland. As it ascends, it gives off several large branches and diminishes rapidly in caliber. In children, the external carotid artery is smaller than the internal carotid artery, but in adults the two are almost of equal size. At its origin, it is present in the carotid triangle and lies anteromedial to the internal carotid artery. Later it becomes anterior then lateral to it and ends by dividing into superficial temporal and maxillary arteries opposite the neck of the mandible **(Sinnatamby, 2005).** In this review, we are reviewing the literature about the branches of the internal and external carotid arteries supplying the nose and the pharynx.

Arterial blood supply of the nose

Major nasal blood flow is by the external and internal carotid arteries. Anatomy is variable between persons (with some vessels absent). Also physical features are different with higher blood pressure in the external vs internal carotid artery (Fig. 1) **(Saban et al., 2012).**